vations. Such were provided gratuitously for the first class of this kind in 1882 in Washington, D. C. Among the published manuals that will be found helpful to the teacher may be mentioned Practical Exercises in Elementary Meteorology, by R. DeC. Ward, Boston, 1899, and Observations and Exercises on the Weather, by James A. Price, American Book Company, New York, 1902. The first of these is especially adapted to normal schools and colleges. The second, by Mr. Price, is not too difficult for the graded public schools.

Mr. Price first provides by means of suitably ruled pages for the systematic record of personal observations of the weather conditions, the clouds, the winds, and the prominent features of storms. Then follow observations by the aid of such instrumens as the barometer, hygrometer, and thermometers; and finally, by means of the daily weather maps, the observed local conditions are correlated with the general weather conditions in the United States.

The general scheme is to be commended. It is sufficiently flexible to be readily adjusted to the capabilities of any school, and by devoting a few minutes to observations daily a knowledge of the various meteorological elements may easily be acquired. The numerous printed questions under each topic are admirably adapted to stimulate the student to observe.

It is important, however, that the most approved methods of observing and recording be followed and it is to be regretted that Mr. Price has needlessly complicated his cloud nomenclature by adding to and altering the principal cloud forms recognized by the International Cloud Committee. Strato-nimbus should be included under nimbus clouds, and strato-cumulus should not be differentiated from cumulo-stratus.

The graphic method of indicating wind direction and fluctuations by means of arrows may have its advantages, but in general abbreviations and symbols should conform to the international system.

There appears to be some confusion in the use of the term hygrometer. In Part V, questions 20–22, the readings of the hygrometer are compared with the readings of the thermometer, as though the former were simply a wet-bulb thermometer. This is an unauthorized new use of the word hygrometer and reprehensible from every point of view. It is very important that there be no double meaning and doubtful meaning of words used in science. On a following page, "hygrometer curves" are provided for and these will be of little value unless they represent either the absolute or the relative humidity of the air. No method has been given whereby the student can find either the absolute or the relative humidity. Table III is intended to give the dew-point when we know the readings of dry and wet bulb thermometers, or the so-called psychrometer; but unfortunately it revives a very crude method long since obsolete and probably never before commended to American observers. It was included in the Smithsonian Tables of fifty years ago merely as of historical interest.

By the footnote on page 44 the author states that to obviate confusion the cyclone is considered as extending "from the center of one anticyclone through the 'low' to the center of the next anticyclone." This is objectionable. Anticyclones should be considered quite apart from cyclones. The progressive movement of the former does not coincide with the latter. Furthermore, the anticyclone is now considered to be the dominating factor in determining weather conditions, rather than the subordinate factor that the above method of study would indicate.

A misplaced decimal point in Table I makes all elevations 1,000 times too small, an error that is liable to mislead inexperienced observers.

A careful revision of this manual should be made before a second edition is issued.—*H. H. K.*

ON THE ALTITUDE OF THE AURORA.

The altitude of the aurora above the earth's surface is a matter on which the widest diversity of opinion still exists. The Editor has endeavored to show that we have no satisfactory basis for the opinion that the auroral light always emanates from some point very high above the earth but that on the contrary observations are best reconciled by the assumption that the source of the light is quite near the earth, and perhaps never higher than the lowest clouds. In fact, it is quite possible that the beams and arcs are illusions.

Now that within a few years we shall have a maximum of sunspots, and therefore an increased number of auroras, the Editor hopes that many will turn their attention to a simple method of observing that may be very helpful in settling the points at issue. If the aurora is an optical illusion, such as the rainbow or halo, then two observers at neighboring stations, or one observer by moving from place to place, will observe the beams and arches of light at the same altitude above the horizon. But if these are material entities having a definite locus, then, as the observer changes his location, the arches and beams will change theirs, as compared with the stars in their neighborhood. The question at issue may apparently be settled if an observer will first make a sketch of the stars in the neighborhood of some special auroral beam or arch, then move quickly a short distance north, south, east, or west, make a second careful sketch of the same stars and beam, then return to the first station and repeat the sketch. As the auroral beams always appear to be in motion, one must compare the average of the first and third sketches with the second sketch, in order to eliminate the influence of any motion of the beam. If this comparison shows that the change in the observer's position has caused an apparent change in the position of the auroral beam, then we have the necessary data for computing its distance and altitude. If several observers start from the center and proceed in different directions, each making his own set of sketches, the results will of course be still more satisfactory. It is ordinarily thought that the reason why computed auroral altitudes are so discrepant is because distant observers have such difficulty in assuring themselves that they are simultaneously observing the same point of light. This difficulty is avoided in the present suggested method. In fact one observer starting from the intersection of two street car lines can travel quickly in four different directions successively and do all the work himself, so as to leave no doubt that he is observing the same point.—*C. A.*

SEA TEMPERATURE AND SHORE CLIMATE.

A memoir on the seasonal variations of atmospheric temperature in the British Isles by Mr. W. N. Shaw, the new Director of the Meteorological Office in London, has been published by the Royal Society and brings out the fact that a small variation in the temperature of the air over Great Britain is observed to be superimposed on the regular annual variation of temperature. All the successive stages of temperature changes from summer to winter, and vice versa, seem to be delayed by the influence of the ocean.

Commenting on this general result, Nature (May 29, 1902, p. 116,) says that in order to investigate this subject The Meteorological Council has made a new departure:

In connection with the publication of the Monthly Pilot Chart of the North Atlantic and Mediterranean Oceans, the cooperation of the mercantile marine has been enlisted to promptly supply daily records of sea temperatures during their voyages. A gratifying response resulted in the return of more than 2,500 ocean temperatures for the month of January, 1902, and 2,750 for February. This mass of valuable information has been grouped in spaces of 2° of latitude by 2° of longitude and the means obtained. The results between 30° north and 60° north form the new feature of the pilot charts of the London Meteorological Office.

* * * Here we have the commencement of an investigation, which, if continued and improved as may be found necessary, should be fruitful of the most useful results.

From 1872 to 1891 the Weather Bureau carried out similar temperature records along the Atlantic coast in rivers and harbors, but, owing to our prevailing westerly winds, the Atlantic Ocean temperatures have but little effect upon American weather. Temperature observations of the Pacific Ocean water would be more interesting, but we doubt whether it would explain the anomalies of the Pacific coast climates. The actual influence of our Great Lakes on the climate of stations on the windward side is appreciable by the increased cloudiness twenty miles from the shore, but not much beyond; its influence on the temperature is only appreciable by the prevention of early frosts by reason of the formation of cloud and fog. The general influence of the Atlantic Ocean on the weather of Great Britain, or of the Pacific Ocean on the weather of northern California, Oregon, and Washington is to produce cloud, fog, and rain and thus affect the temperature indirectly. The direct effect of a rise or fall in the temperature of the ocean surface is analogous to the direct effect of the changes in the temperature of a land surface. Both should be expressible by an algebraic formula, consisting essentially of two terms, viz: (1) a term expressing the heat given back to the air by conduction and convection and radiation, all of which, of course, is much larger by daytime and smaller by night-time for the land as compared to the ocean, and (2) a second term expressing the quantity of latent heat conveyed to the air by the evaporation of moisture, which on the average of the day and night is greater for the ocean than for the land. But when the lower layers of air thus warmed and moistened have moved to a great distance horizontally or vertically, or when, without much motion, this air is cooled down by radiation, then the land air keeps clear longer than the ocean air and it is this property that produces the great variety of climates to the leeward of the water.

It will be interesting to compare the actual figures for the monthly mean air temperatures on the west coast of Great Britain and on the west coast of North America, and the following table gives the figures as read off from the charts of Bartholomew's Physical Atlas, Plate VI of the British Isles, and Plate VIII for the United States and Canada. We have taken four representative points on the British coast, but only two on the American coast, because the latter are so much farther south in latitude that, strictly speaking, only the northernmost, viz, Vancouver Island, latitude 50°, should be compared with Lands End, latitude 50°.

Months.	Great Britain.				America.	
	Hebrides. Lat. 57°.	North Ireland. Lat. 55°.	South Ireland. Lat. 51°.	Lands End. Lat. 50°.	Vancouver. Lat. 50°.	Mouth of Columbia. Lat. 46°.
	°	°	°	°	°	°
January	42.5	42.0	44.5	44.5	42.0	40.0
February	42.0	42.0	45.0	45.5	40.0	42.0
March	42.0	43.0	46.0	46.0	43.0	46.0
April	45.0	47.0	49.0	49.5	47.0	49.0
May	49.0	51.0	52.5	53.0	49.0	55.0
June	54.0	55.0	57.5	58.5	54.0	57.0
July	55.5	58.0	59.5	61.5	55.0	60.0
August	56.0	58.0	60.0	61.5	55.0	60.0
September	54.0	55.0	57.0	59.0	53.0	57.0
October	49.5	50.0	52.0	54.0	49.0	53.0
November	45.5	45.0	48.0	49.0	45.0	47.0
December	44.0	44.0	46.0	46.0	40.0	42.0
Annual temperature	47.0	49.0	51.5	52.5	49.0	50.0
Annual ranges	14.0	16.0	14.0	16.0	15,0	20.0

The general character of the weather is controlled principally by the vertical ascent or descent of the wind and by its northern or southern direction much more than by the fact that it blows from the ocean. All winds that come from the Pacific have sufficient moisture to form rain and prevent the occurrence of either extremely hot or extremely cold weather, provided only they can be forced to rise up and be cooled dynamically or blow northward and be cooled by radiation. Both these causes conspire to form the winter rains on the Pacific coast north of latitude 40°, and also in Great Britain north of latitude 50°, but neither of them contribute to the formation of rain at any time of the ordinary year south of San Francisco, Cal., latitude 38°.—*C. A.*

TREES AS FORECASTERS OF RAIN.

A correspondent writes:

People often say "it is a sign of rain when the wind blows up the leaves so as to show the white lower side." What is the element of truth, if any, in this that has given rise to this current statement?

Since there is no known meteorological reason for the phenomenon described, the question was submitted to the Chief of the Bureau of Plant Industry, United States Department of Agriculture, and we give herewith the reply received from Mr. A. F. Woods, Pathologist and Physiologist.

It is true that people often say that the turning up of the leaves is a sign of rain. I have heard the remark many times, but as far as my observations go the sign does not seem to be a very sure one. There are many kinds of trees, like the silver-leaf poplars, in fact all the poplars, the maples, and some of the oaks, which turn their leaves up whenever there is a fairly strong, steady wind, but they do it as much in clear weather as in rainy. It has been suggested to me that possibly the belief may have arisen from the fact that winds capable of turning leaves over very often precede or follow rainstorms, and as people are usually on the alert when the general atmospheric conditions favor rain, looking for signs to confirm the general feeling they have that it is going to rain, it might be that the turning up of the leaves would be especially noted at such times.

METEOROLOGY IN ARGENTINA.

It is well known that our countryman, Dr. B. A. Gould, of Cambridge, Mass., after having established an astronomical observatory in Argentina, turned his attention to climatology and inaugurated a meteorological office, under the general directorship of Mr. Walter G. Davis, who had accompanied him from this country. After publishing about twenty annual volumes of meteorological observations and climatological investigations, Mr. Davis has now succeeded in realizing the great step in meteorology that has been taken by nearly every other climatological bureau. He has namely, organized in Buenos Ayres, under the Argentine Department of Agriculture, a branch office that publishes a daily weather map based on telegrams from all available points. A recent letter from Mr. Davis states that—

Since the beginning of this year I have had my time fully occupied in getting the daily weather map service organized; it is now fairly started, but far from being complete. We have free use of the national telegraph lines, as well as of nearly all the private railway wires, for the transmission of the 2 p. m. observations. At present there are nearly 70 stations sending in complete observations and 350 pluviometric stations. Within the next few months I hope to have about 130 second-class stations and a large increase in the rain-reporting stations. The observations are sent here (Buenos Ayres) and the maps printed in our own establishment. The recent extension of the telegraph lines to the southern territories has been a great boon to us from a meteorological point of view; the coast line is now at Rio Gallegos, in Santa Cruz, and another branch is being constructed near the foot of the Cordillera from latitude 38° to 47° south, and then crosses the country to the Atlantic coast. This is a most important line for us, as it will give us communication with the region where nearly all the "pamperos" have their birth and development.

No attempt has been made at forecasting, as I consider it better to have some experience with the conditions as shown by the daily maps before undertaking to do too much. I trust, however, that this branch of the work will come in due time.

The daily map published by the meteorological office at Buenos Ayres makes a very imposing appearance. It is 16.2 inches high by 11.1 broad and extends between the forty-sixth and seventy-seventh degrees of longitude west from Greenwich and between the twenty-first and fifty-seventh degrees of south